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U1S S1110 S1815

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INT CL^5 B65D 49/02 49/04 49/06 49/08 49/10
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(54) A fitment for inhibiting refilling of a bottle

(57) A fitment for inhibiting the refilling of a bottle comprises a one-way valve 5 to allow outward flow of liquid and to prevent unauthorised refilling of the bottle 1 and vacuum break, gravity operated valve 2 - 4 to allow air to pass into the bottle 1 when a partial vacuum exists in the bottle 1, separate liquid and air passage means 6, 7 being provided. The one-way valve in the liquid passage may be a flap valve, a ball valve (Figures 17 - 19), a disc valve (Figure 16), an umbrella valve (Figures 20 - 22) or film and grid valve (Figure 22), and a weight may be provided to slide into and out of contact with the valve (17, Figure 3). The vacuum break valve comprises a float member 2, a weight member 4 and a sealing member 3 for sealing an air inlet 9. The weight member has an offset centre of gravity to ensure sealing member 3 seals inlet 9 when the bottle is in a horizontal position, inversion of the bottle through at least 120° being needed to unseal inlet 9. If liquid is introduced into air passage 7 float member 2 will be lifted and cause sealing member to seal inlet 9 and block introduction of further liquid. The float and weight members may form an integral member of neutral buoyancy (Figure 12), the float and sealing members may be integral or the weight and sealing members may form a unit (Figure 11).

FIG. 1

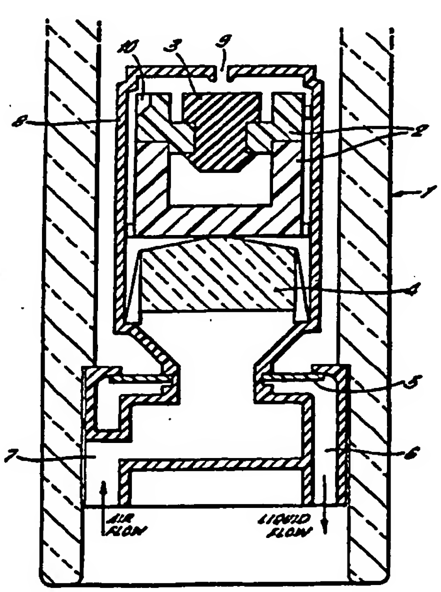

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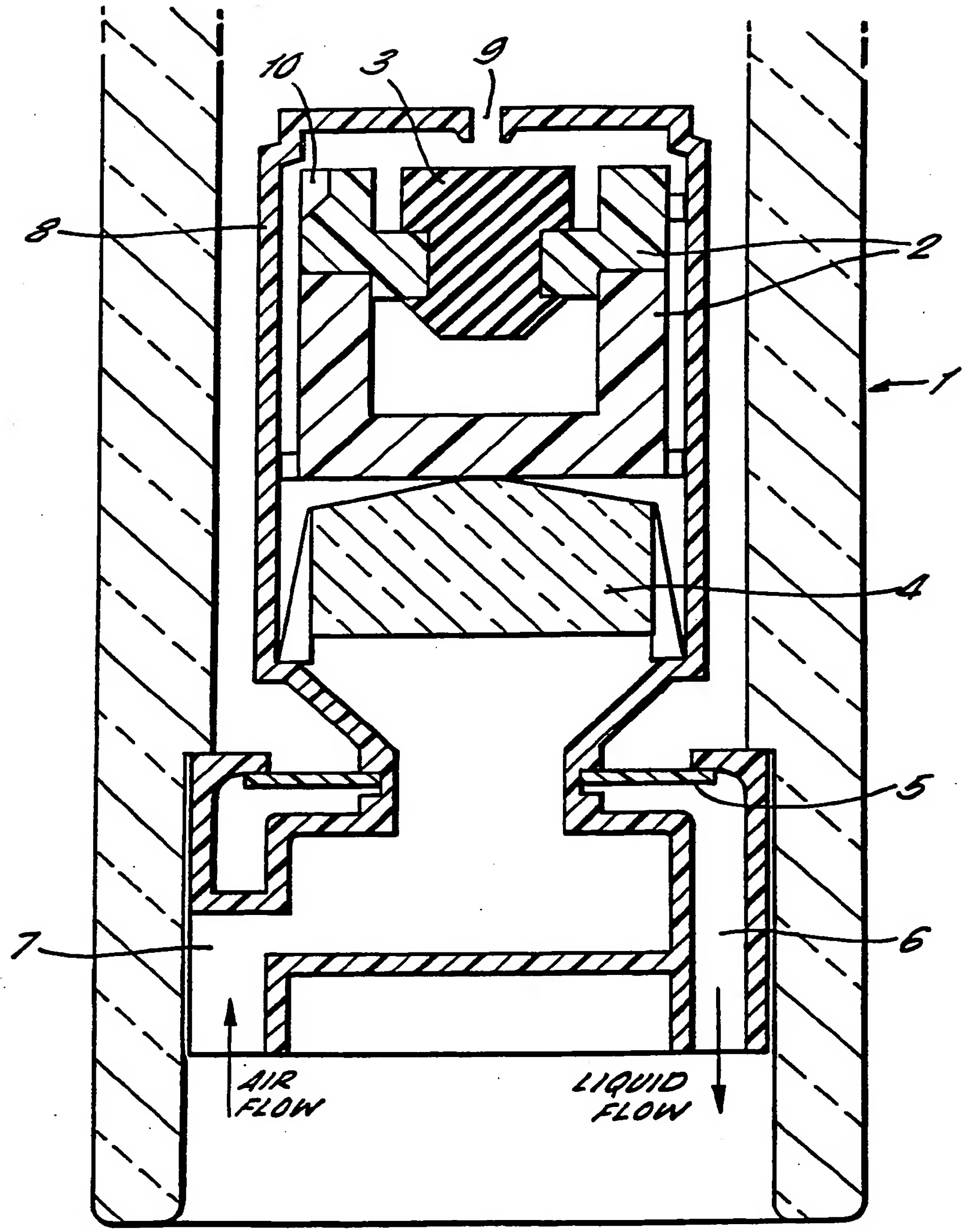
FIG. 1.



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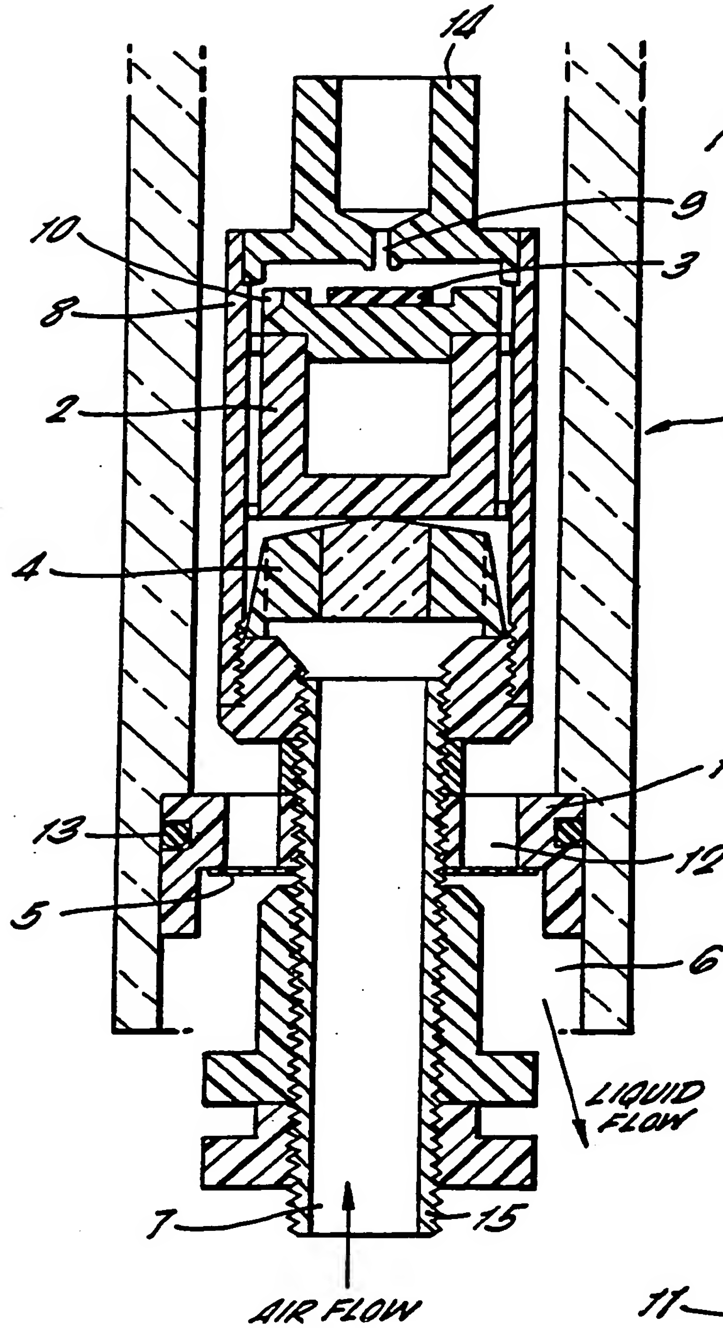
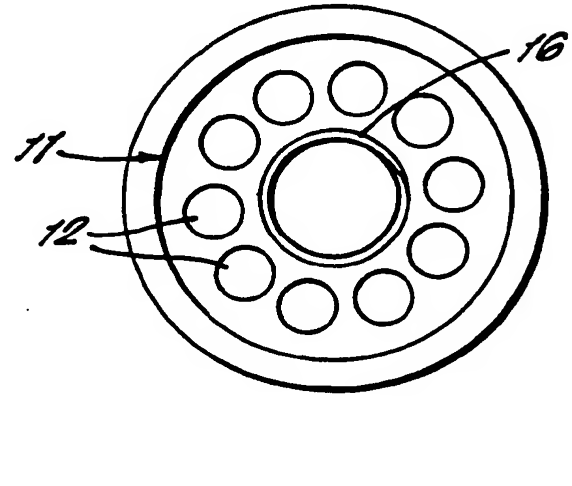


FIG. 2.

FIG. 2a.



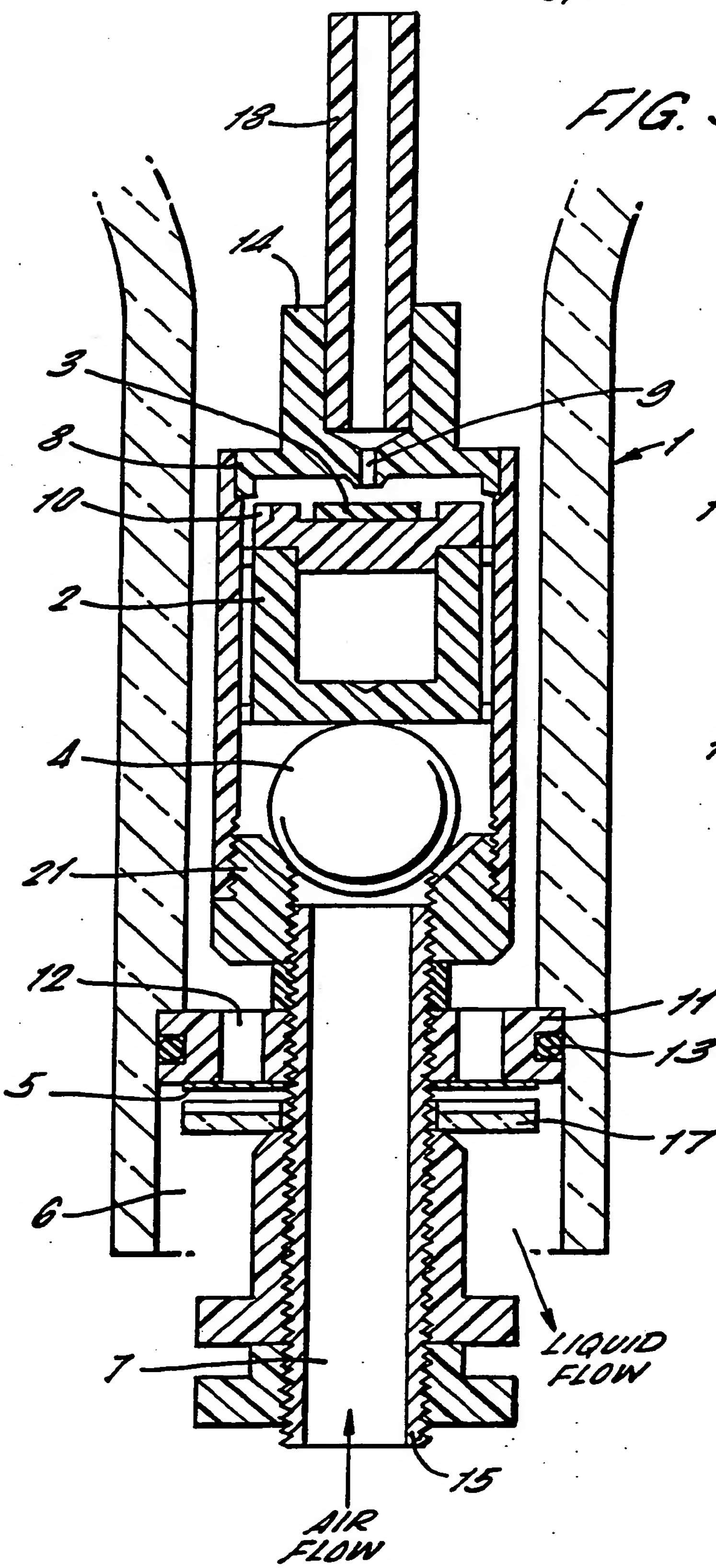

18
14
3
8
10
2
4
21
12
5
6
7
15
9
1
11
13
17
LIQUID FLOW
AIR FLOW

FIG. 3.

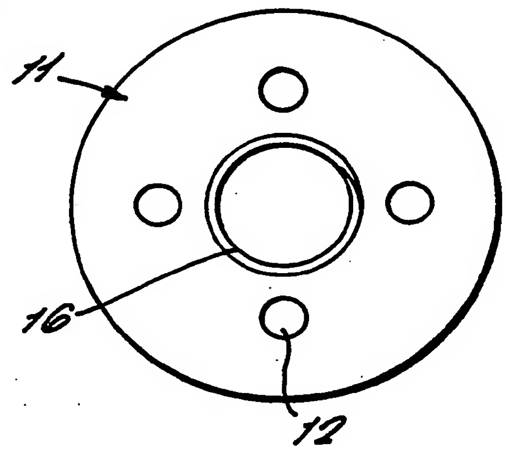

11
16
12

FIG. 3a.

FIG. 4.

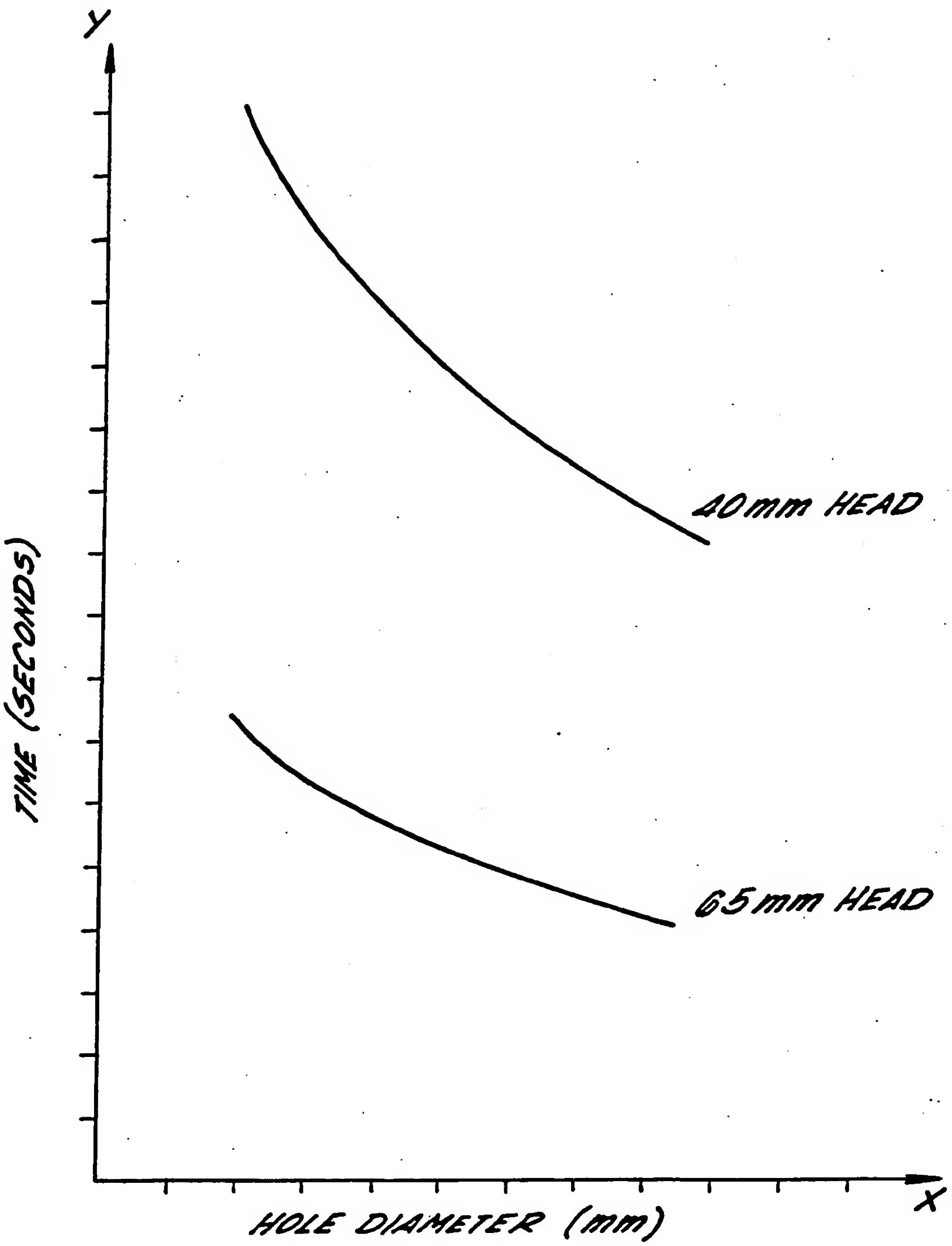
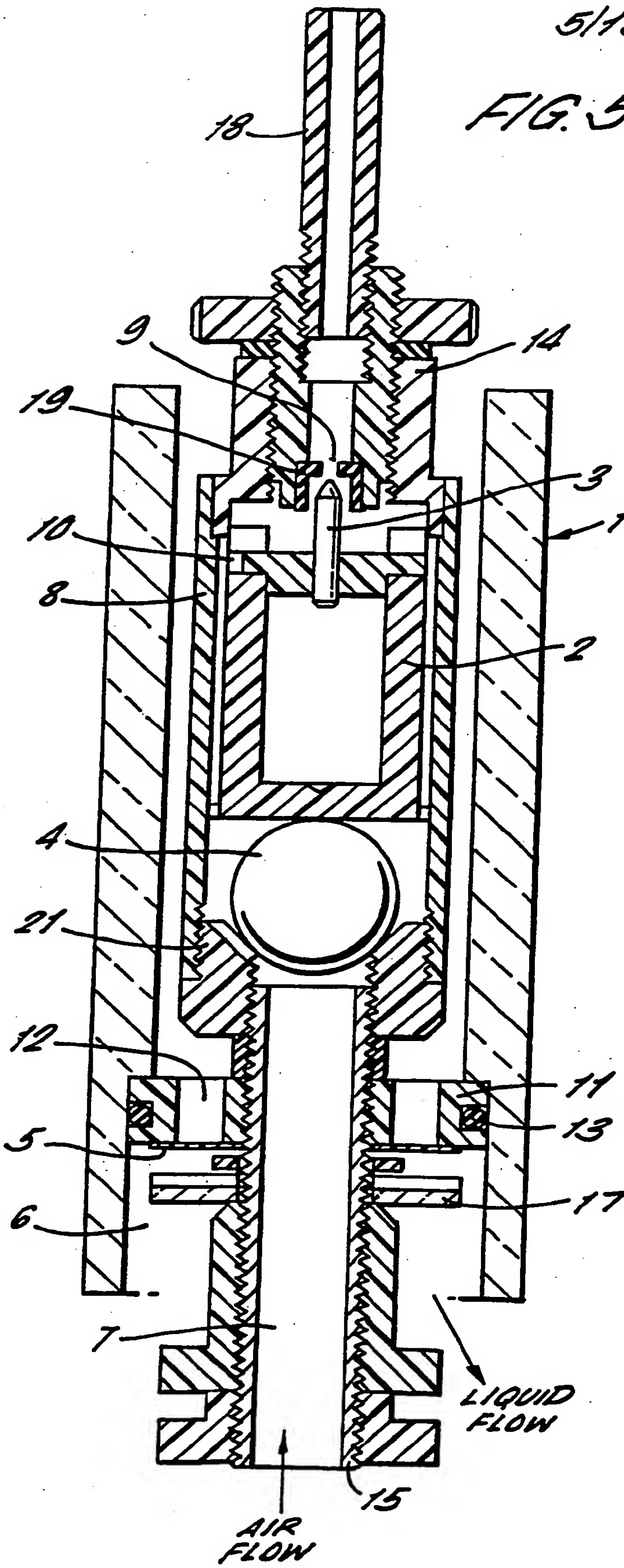


FIG. 5.


18
14
9
19
3
10
1
8
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21
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5
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6
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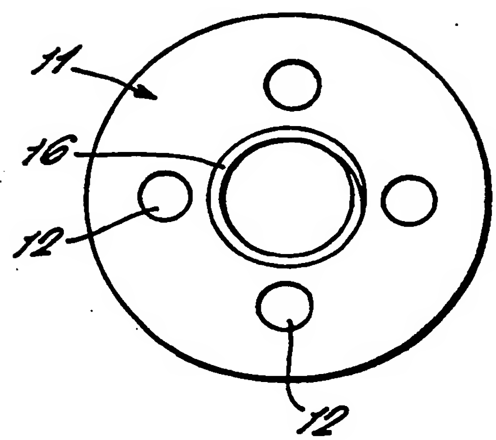
7
LIQUID FLOW
15
AIR FLOW

FIG. 5a.


11
16
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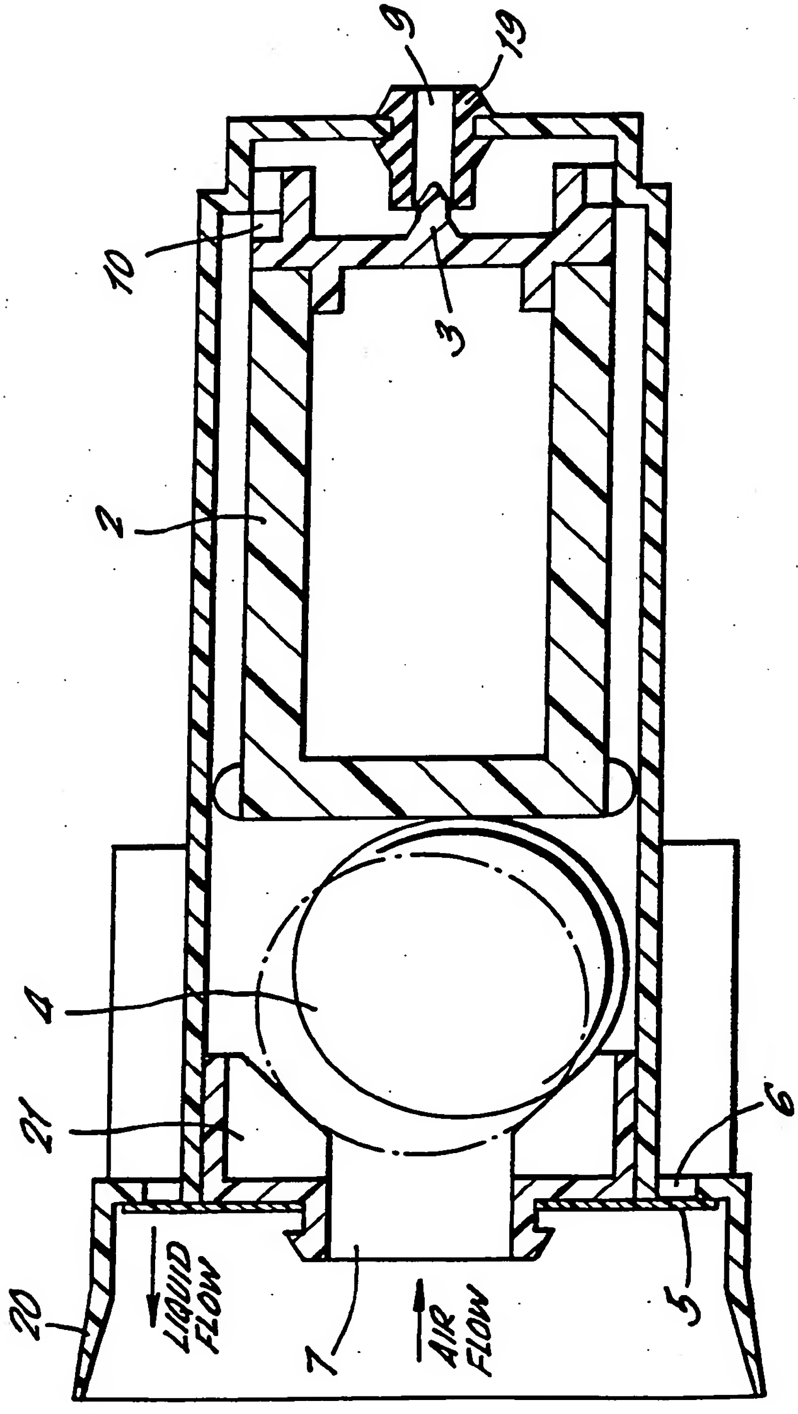


FIG. 6.

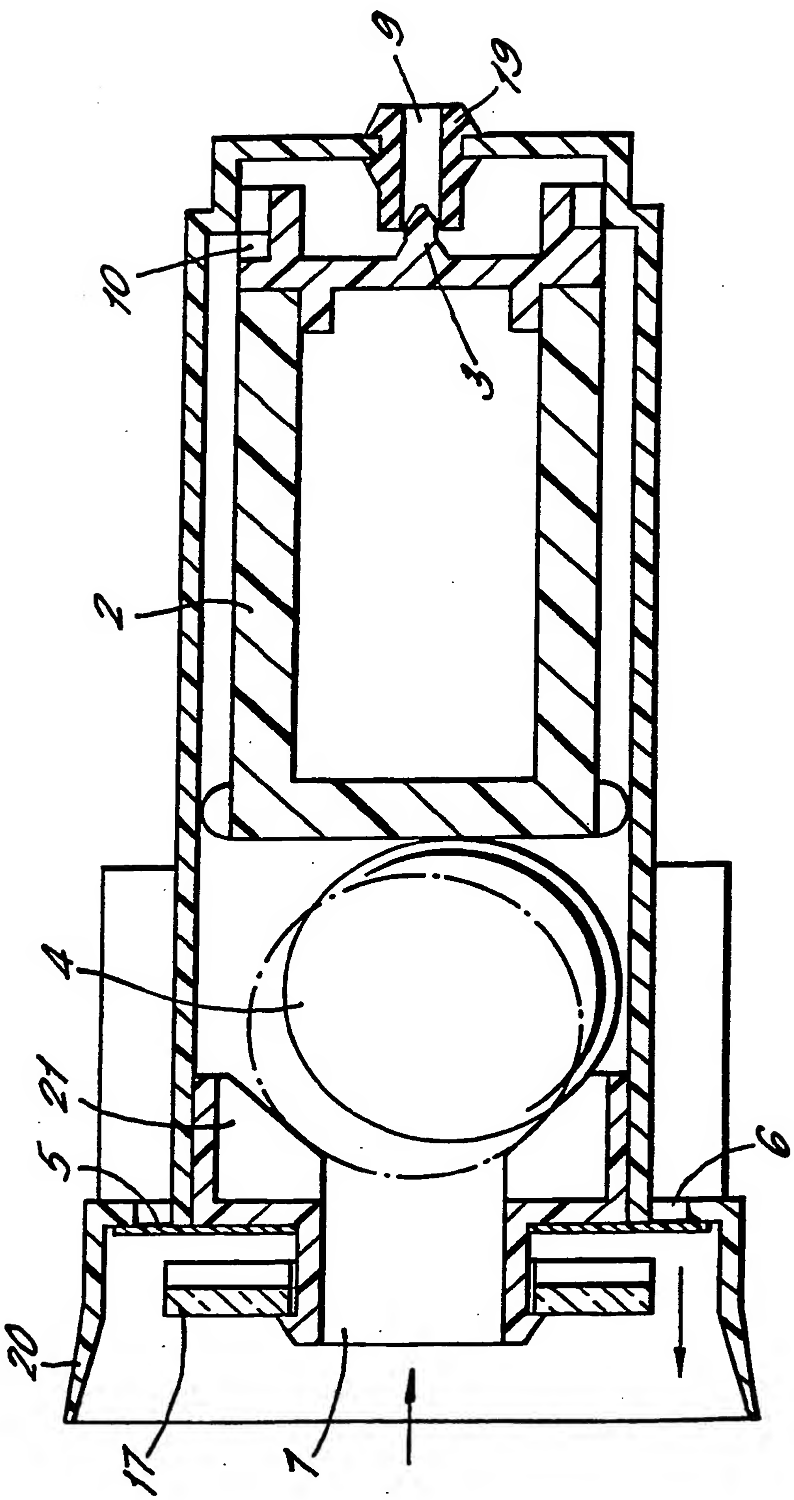
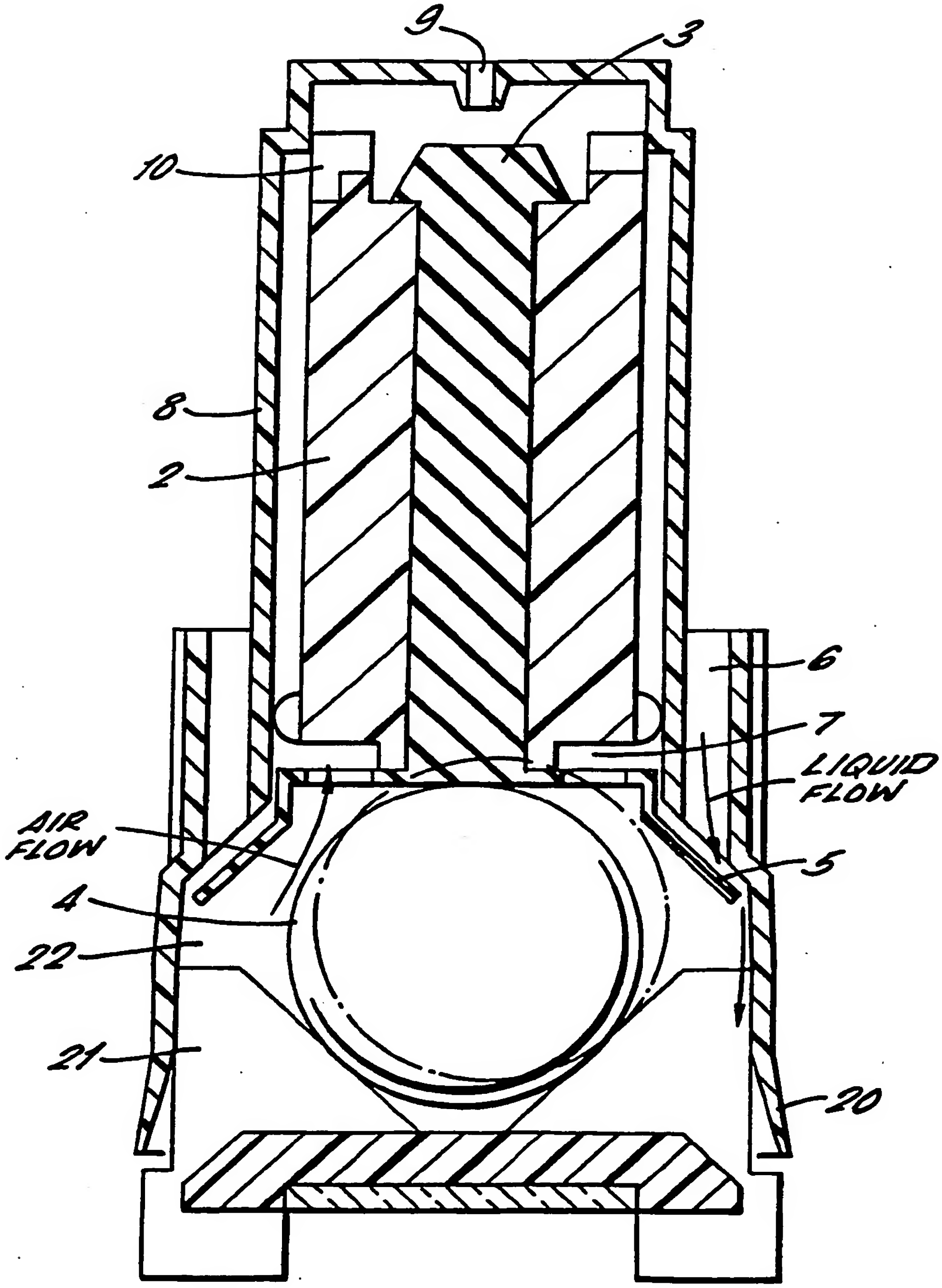


FIG. 7.

FIG. 8.



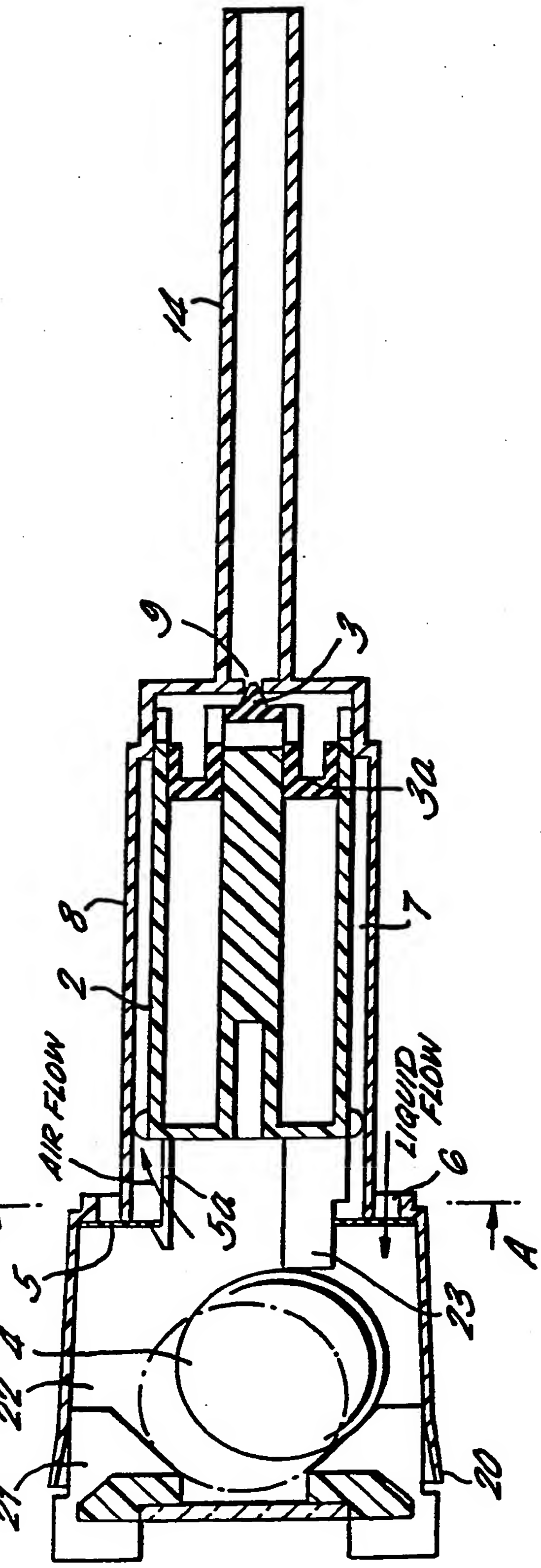


FIG. 9.

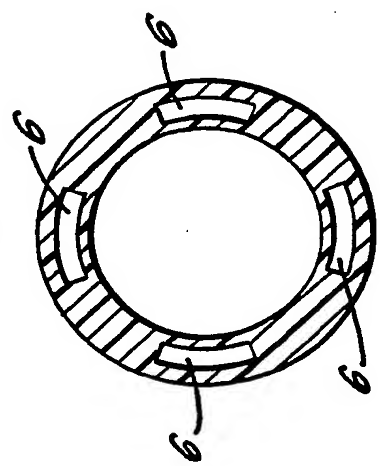


FIG. 9a.

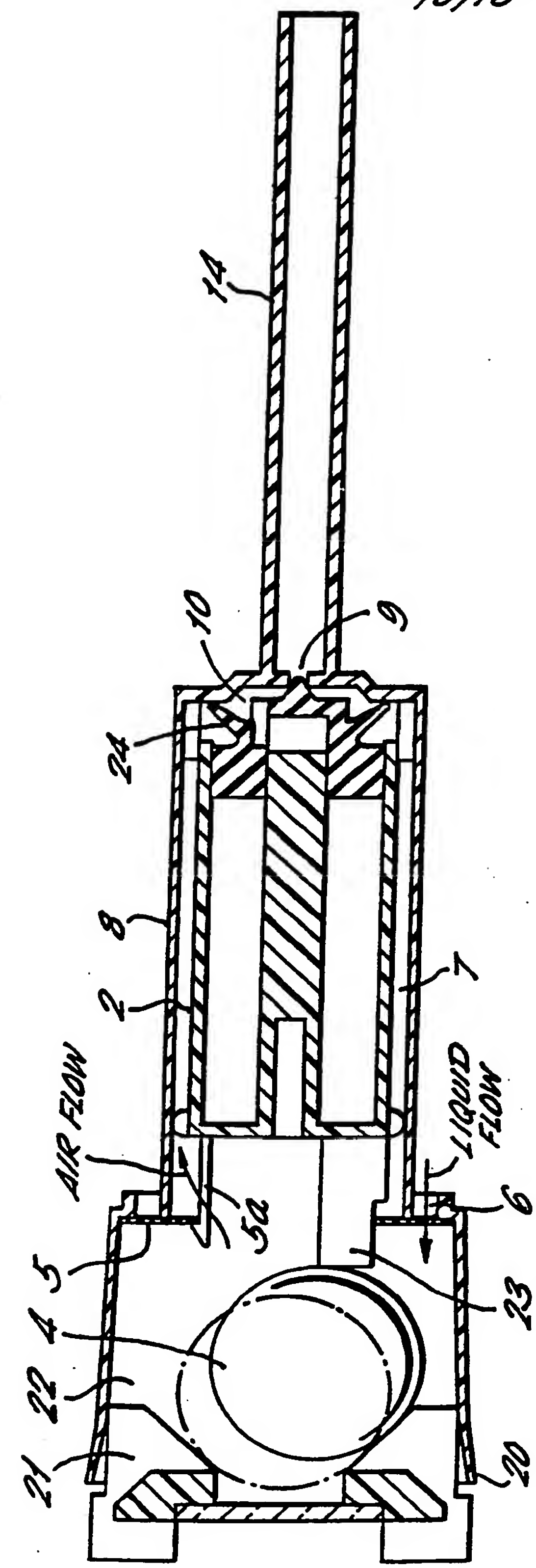


FIG. 10.

FIG. 11.

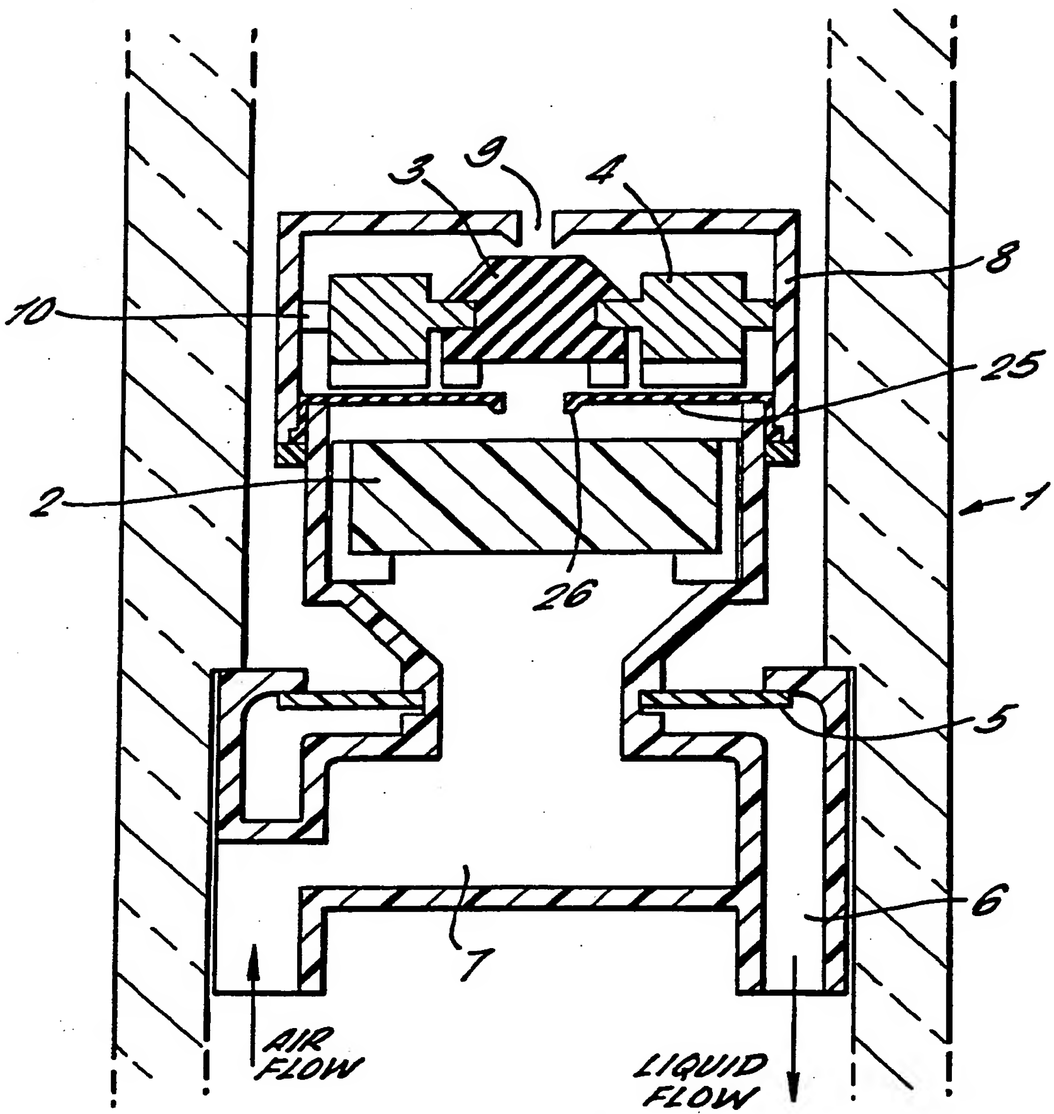


FIG. 12.

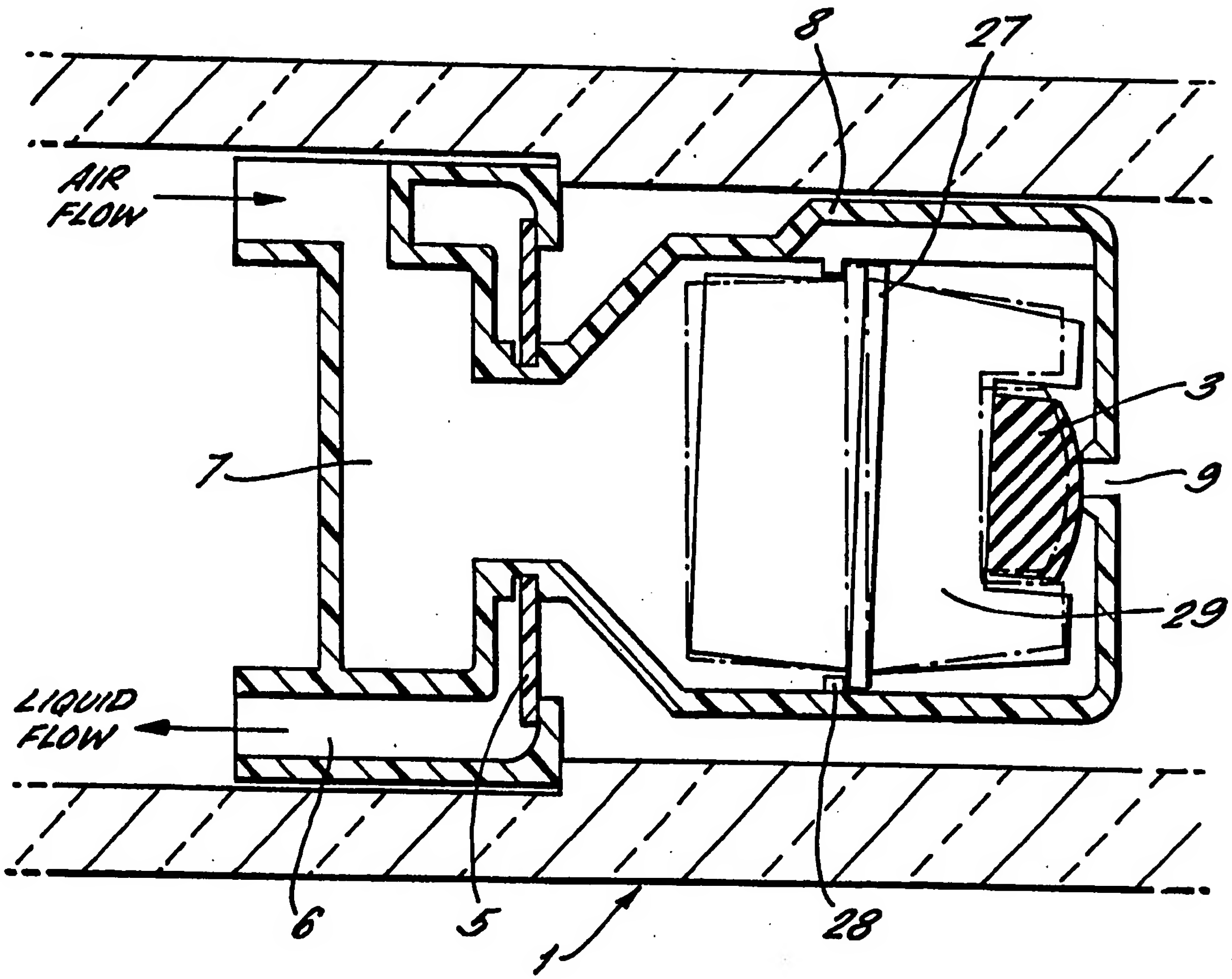


FIG. 13.

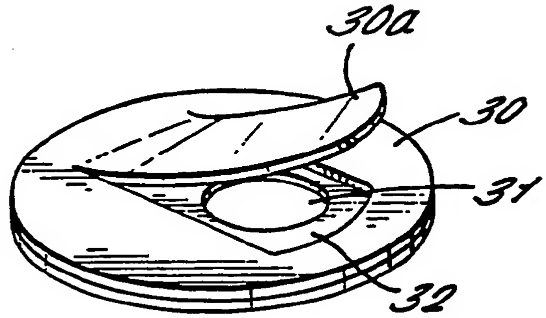


FIG. 14.

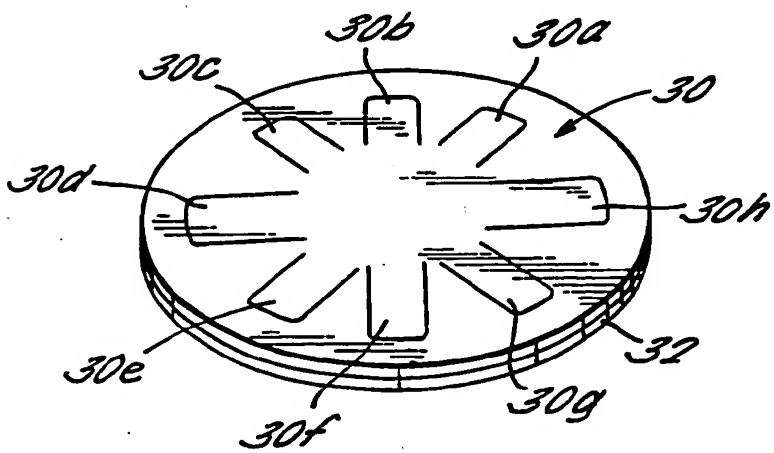


FIG. 15a.

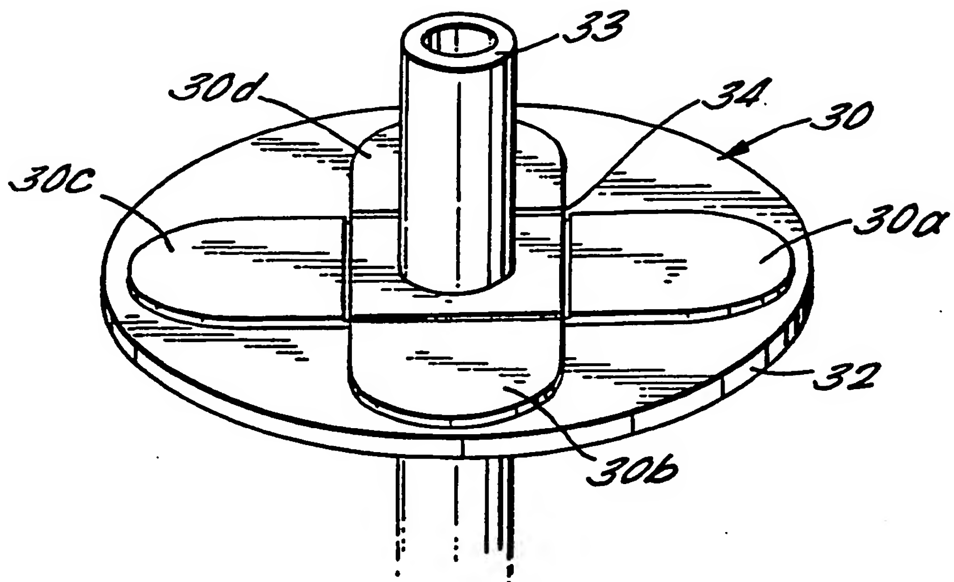


FIG. 15b.

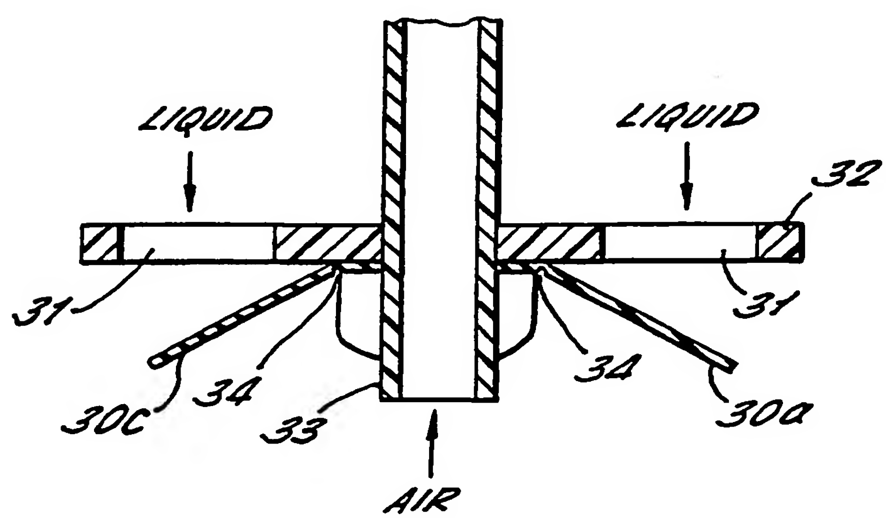


FIG. 16.

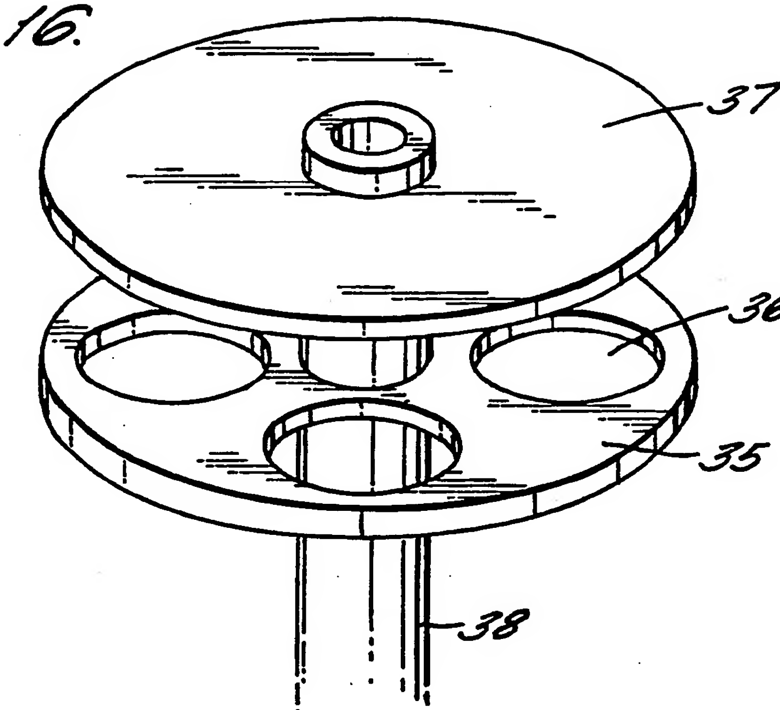
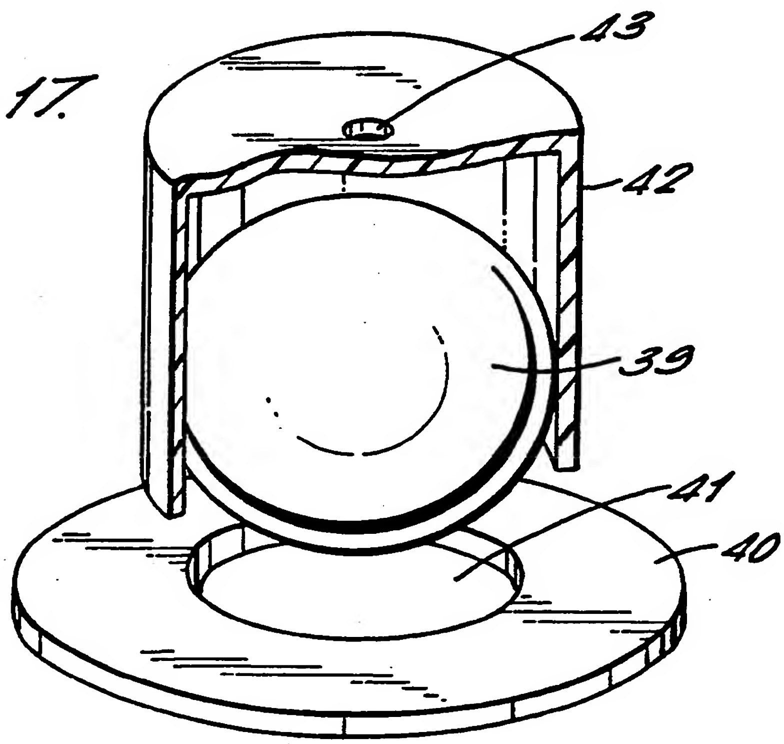


FIG. 17.



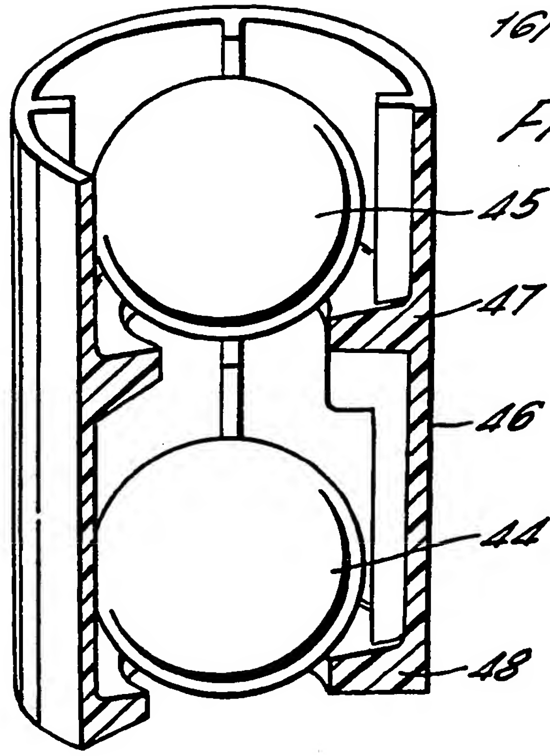


FIG. 18.

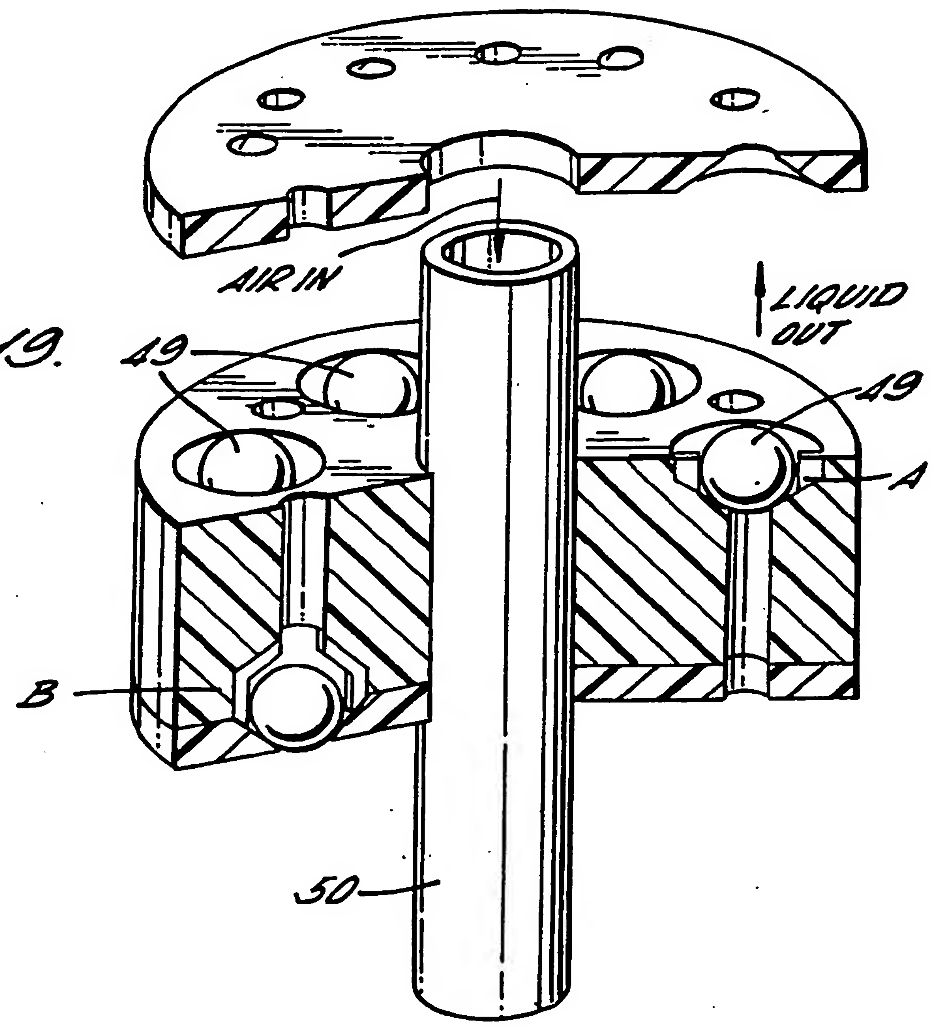


FIG. 19.

FIG. 20.

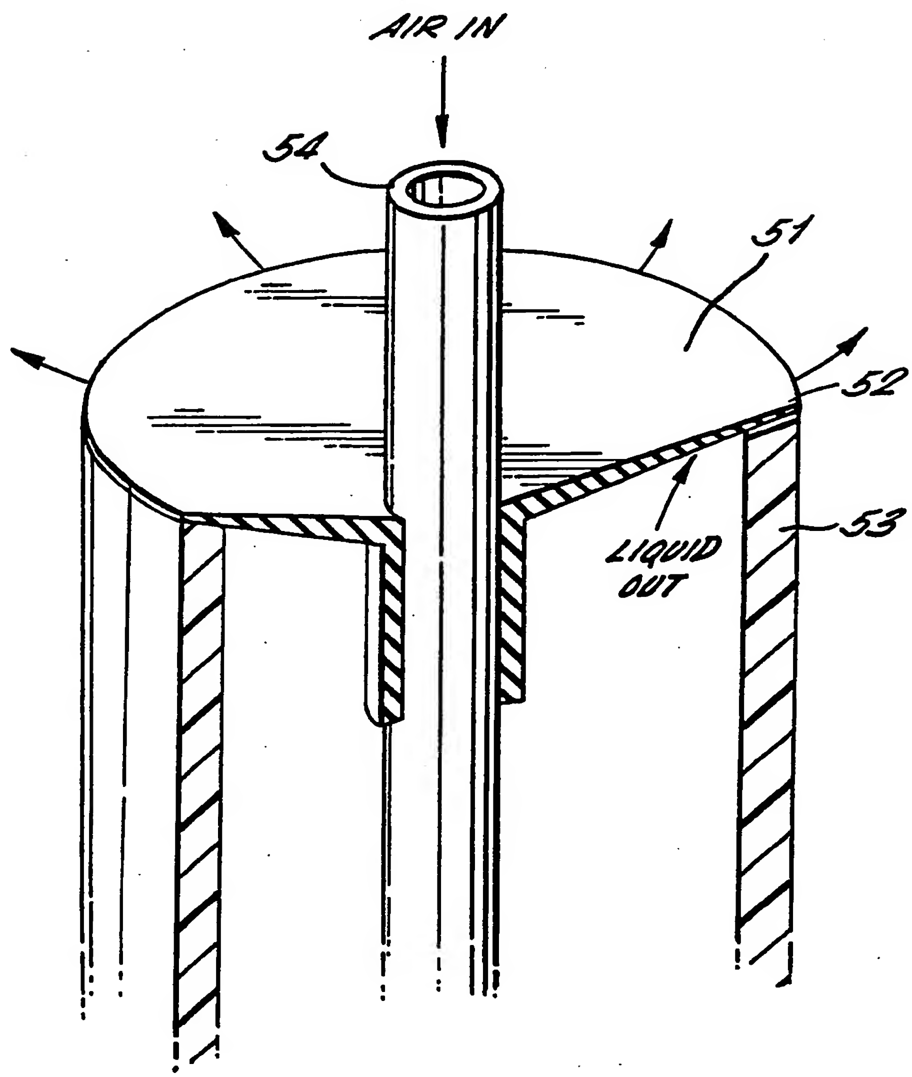


FIG. 21.

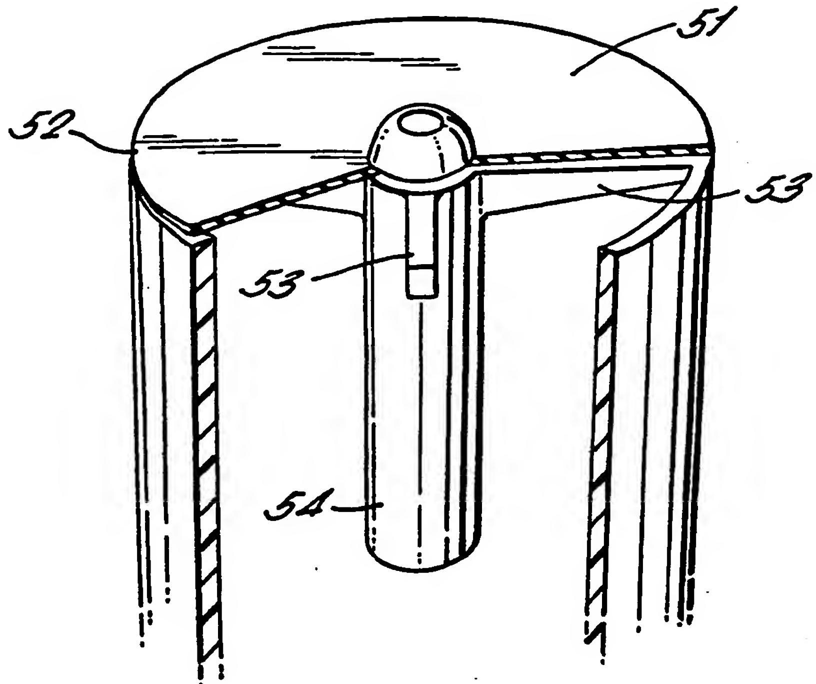
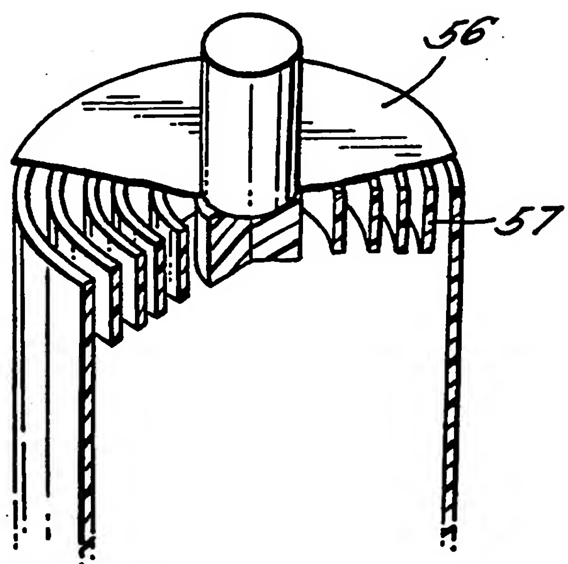


FIG. 22.



A FITMENT FOR A BOTTLE

The present invention relates to a fitment for a bottle, in particular, a fitment which inhibits refilling of the bottle.

It is known to provide bottles with closures which include one-way valves to prevent refilling of the bottle once the original contents have been emptied or partially depleted. However, a problem experienced with such an arrangement is that under certain heating/cooling conditions a partial vaccum can be created beneath the one-way valve means which prevents further outward flow of liquid by holding the one-way valve means in its sealing position. A typical example would be when the temperature of a bottle increases so that the contents (e.g whisky and air) expand causing any excess air to pass through the one-way valve means to atmosphere. If the bottle is then cooled (eg by placing in a refrigerator) the contents will contract but the one-way valve means will prevent air being sucked back into the bottle. This results in the valve means being held firmly closed by the partial vacuum below the one-way valve means. In order to facilitate release of further liquid from the bottle, the pressure difference across the one-way valve must be reduced. This should preferably be achieved when the bottle is inverted to pour liquid out. Clearly, it is considered desirable to provide a fitment which is not subject to the problems associated with a partial vacuum.

The applicants have proposed a solution to the problems associated with a partial vacuum in United Kingdom Patent Application No. 9121749.7 (not yet

published) where a fitment is provided with vacuum break means to allow air to pass into the bottle when a partial vacuum exists. The vacuum break means is operable by gravity on inverting the bottle and generally comprises a sealing member in contact with a small aperture which cannot be held by the partial vacuum. However, in the fitment proposed, the liquid flowing out from the bottle and air flowing into the bottle are allowed to mix which can result in a turbulent flow of liquid from the bottle. Smooth pouring characteristics are obviously desirable and accordingly, the present invention seeks to overcome this problem.

Accordingly, the present invention provides a fitment for a bottle of the kind comprising one-way valve mechanism to allow outward flow of liquid from the bottle and to prevent unauthorised refilling of the bottle and vacuum break means to allow air to pass into the bottle when a partial vacuum exists in the bottle wherein separate liquid and air passage means are provided for the outward flow of liquid from the bottle and the inward flow of air to the bottle.

Preferably, the one-way valve mechanism comprises a first one-way valve means located in the air passage means and a second one-way valve means located in the liquid passage means.

It is advantageous to have separate one-way valve means in the liquid and air passages so that it is not possible to refill the bottle by way of either passage.

Preferably, the vacuum break m ans is operable

by gravity on inverting the bottle.

Preferably, the first one-way valve means comprises a float member, a weight member and a sealing member for sealing the air inlet of the air passage means.

Preferably, the weight member urges the sealing member into a position which seals the air inlet until the bottle is inverted by substantially 120°

Preferably, the float member and weight member form an integral member of neutral buoyancy.

Preferably, the vacuum break means comprises the float member and the sealing member of the first one-way valve means as an integral unit co-operating with the air inlet, the dimensions of the air inlet being such that the combined weight of the float member and sealing member cannot be held by a partial vacuum inside the bottle.

Preferably, the vacuum break means comprises the weight member and the sealing member of the first one-way valve means as an integral unit co-operating with the air inlet, the dimensions of the air inlet being such that the combined weight of the weight member and sealing member cannot be held by a partial vacuum inside the bottle.

Preferably, the vacuum break means comprises the float member, the sealing member and the weight member of the first one-way valve means as an integral unit co-operating with the air inlet, the dimensions of the air inlet being such that the combined weight of the float member, the sealing

member and th weight member cannot be held by a partial vacuum inside the bottle.

Preferably, the second one-way valve means is a flap valve arrangement.

Preferably, the second one-way valve means is a ball valve arrangement.

Preferably, the second one-way valve means is a disc valve arrangement.

Preferably, the second one-way valve means is an "umbrella" valve arrangement.

Preferably, the second one-way valve means co-operates with a valve seat having a plurality of holes therethrough.

Preferably, a weight is provided in the vicinity of the second one-way valve means which can slide into contact with and away from the valve means.

Preferred embodiments of the present invention will now be described in detail, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 is a cross sectional view through a first preferred embodiment;

Figure 2 is a cross sectional view through a second preferred embodiment;

Figure 2a shows detail of the valve seat in Figure 2;

Figure 3 is a cross sectional view through a third preferred embodiment;

Figure 3a sh ws detail of the valve seat in

Figure 3;

Figure 4 is a graph representing how the time to empty a bottle varies with the size of the air inlet;

Figure 5 is a cross sectional view through a fourth preferred embodiment;

Figure 5a shows detail of the valve seat in Figure 5;

Figure 6 is a cross sectional view through a fifth preferred embodiment;

Figure 7 is a cross sectional view through a sixth preferred embodiment;

Figure 8 is a cross sectional view through a seventh preferred embodiment;

Figure 9 is a cross sectional view through an eighth preferred embodiment;

Figure 9a shows detail of the housing in direction A-A of Figure 9;

Figure 10 is a cross sectional view through a ninth preferred embodient;

Figure 11 is a cross sectional view through a tenth preferred embodiment;

Figure 12 is a cross sectional view through an eleventh preferred embodiment;

Figures 13 to 22 depict a number of one-way valve means for location in the liquid passage means of the fitments depicted in Figures 11 to 12.

In Figure 1 a fitment is shown in cross section which is intended for location in the neck of a bottle 1. The bottle 1 is shown in an inverted position such that liquid can flow outwardly and air can flow inwardly. However, the bottle 1 need not be invert d by 180^{o} before the liquid will pour since the fitment is designed to allow flow for inversion through only 120 .

The fitment comprises a one-way valve mechanism 2,3,4 and 5, to allow only outward flow of liquid and to prevent unauthorised refilling of the bottle. There is also a vacuum break means 2,3,9, to allow air to pass into the bottle when a partial vacuum exists. The fitment is characterised in that separate liquid and air passages 6 and 7 are provided to ensure that liquid and air do not mix thereby ensuring that turbulence is kept as low as possible during pouring to provide smooth flow characteristics. However, it should be noted that some turbulence will result even if mixing of liquid and air does not occur due to the flow of liquid through the various passages in the fitment. Furthermore, although only single liquid and air passages are shown, clearly a plurality of such passages provided with suitable one-way valve mechanisms would be an alternative construction.

The one-way valve mechanism preferably comprises a float member 2, a rubber sealing plug 3 and a weight 4 (preferably ceramic or another such suitable material) located in the air passage 7 and a flap valve 5 located in the liquid passage 6. The one-way valve mechanism is located within a housing generally indicated by reference numeral 8. The sealing plug 3 seals air inlet 9 in housing 8 in certain orientations and under certain conditions of the bottle which will be described.

When the bottle 1 is upright, the weight 4 will fall under gravity and push the float member 2 and rubber sealing plug 3 over air inlet 9. The flap valve 5 will seal liquid passag 6. Accordingly, it will not be possible to intr duce liquid either by

way of liquid passage 6 or air passage 7.

If the bottle is horizontal the weight 4 has an offset centre of gravity which ensures that it will fall against float member 2 so that rubber sealing plug 3 will seal air inlet 9. The weight 4 will act in this way until the bottle has been inverted by more than 120°. Therefore, it is extremely difficult to refill the bottle when horizontal by attempting to balance the one-way valve means in the air passage 7 such that it is open.

If the bottle is fully inverted (as shown in Figure 1), the weight 4, float member 2 and rubber sealing plug 3, will fall away from air inlet 9 as shown in Figure 1. However, if any liquid is introduced into air passage 7, the float member 2 will be lifted and thus the rubber sealing plug 3 will eventually cover air inlet 9 to block the introduction of further liquid. Since the flap valve 5 in liquid passage 6 acts to allow only outward flow of liquid, no liquid can enter via this route.

If the bottle is vibrated when upright in order to make the rubber sealing plug 3 and float member 2 jump off the air inlet 9, liquid cannot be introduced successfully since the only route for the liquid is through a small notch 10 in float member 2. As it is difficult for liquid to enter the area between the housing 8 and float 2, a considerable amount of time would be involved in refilling the bottle by vibration.

Pulse filling is another technique which could be employed to attempt to refill the bottle. This involves a rapid repetitive sequence of extracting

air from th b ttle and forcing liquid into the bottle. A syringe is used to extract air through flap valve 5 and then liquid is forced through the fitment before it can close. However, the rubber sealing plug 3 is unlikely to open for the reasons described above in connection with vibration filling and the liquid entering via flap valve 5 will be minimal.

The vacuum break means comprising rubber sealing plug 3, float member 2 and air inlet 9 is based on the assumption that the maximum likely pressure to be overcome will be approximately 2 p.s.i (lb/in^2) ($0.93\ kg/m^2$). For this pressure the float member 2 and rubber sealing plug 3 must have a combined weight in excess of 1g in order to overcome the partial vacuum in the bottle when the bottle is inverted. The pressures inside and outside the bottle can then equalise and the one-way valve means in the air passage can operate effectively allowing pouring of the liquid.

Figure 2 is a second preferred embodiment of the present invention in cross section. The bottle 1 is again shown in an inverted position for outward flow of liquid. Like reference numerals represent like features to those in Figure 1. In this embodiment, there is a valve seat 11 for flap valve 5 which is depicted in Figure 2a. The valve seat 11 has ten apertures 12 for passage of liquid and a threaded centre hole 16. There is also an O-ring 13 sealing the valve seat 11 against the inner surface of bottle 1. The sealing member 3 is now a flat rubber pad rather than a plug as in Figure 1. The housing 8 has an extended portion 14 within which air inlet 9 is located. There is als a threaded brass

tube 15 which forms part of the air passage 7 and connects to the threaded central hole 16 of valve seat 11.

The fitment in Figure 2 will operate in substantially the same way as the fitment in Figure 1 under the filling and pouring conditions described.

Figure 3 depicts a further embodiment of the fitment which is a variation on the fitment in Figure 2. Like reference numerals represent like features to those in Figure 2. In this embodiment the weight 4 has been replaced by a glass ball 4 and ball seat 21 which provides a lower cost sideways closing device. In addition, the effective head of liquid (i.e the distance between the liquid outlet and the air inlet) has been increased by further extending the portion 14 of the housing 8 by adding a tube 18. It has been found that extending the head by as little as 25 mm has a dramatic effect on flow rate from the bottle allowing the apertures 12 in valve seat 11 to be reduced to four (see Figure 3a). The presence of air in the liquid passage 6 can thereby be almost eliminated.

A further factor which affects flow rate is the size of the centre hole 16 in valve seat 11. Experiments were carried out to determine whether an increase in diameter of hole 16 would significantly increase flow rate. The results of testing the emptying time (y-axis) for a number of hole sizes (X-axis) for head lengths of 40 mm and 65 mm are depicted graphically in Figure 4. From the graph it is clear that a 65 mm head gives a much quicker emptying time (Y-axis) for a 75 cl bottle. In addition, a greater diameter hole 16 (X-axis) further

reduces the emptying time and thus increases the flow rate.

The fitment in Figure 3 also comprises a weight 17 which can slide axially on the threaded brass tube 15 to ensure that flap valve 5 returns to valve seat 11 quickly to resist pulse filling.

Figure 5 shows a further preferred embodiment of the fitment which is a development of the fitment in Figure 3. Like reference numerals represent like features to those in earlier Figures. In addition to minor variations to the size of float member 2, extended portion 14 of housing 8 and weight 17, the flat sealing member 3 and air inlet 9 in Figure 3 have been replaced by a needle 3 which acts as a sealing member in a silicone rubber sleeve 19 having an air inlet 9. Again, it was found that the effective head between the liquid outlet and air inlet produced better flow rates than embodiments having no passage extension by way of the tube 18 and the threaded brass tube 15. Figure 5a shows detail of the valve seat 11.

In Figure 6 a further preferred fitment is shown (without bottle 1). The fitment is shown in a horizontal position and accordingly, there is no outward flow of liquid from the bottle. This will occur when the fitment has been inverted through 120°. The ball 4 is shown in broken lines for inversion of the fitment by 120°. In this Figure, the extended portion 14 of housing 8 and the threaded brass tube 15 have been dispensed with. The housing 8 now has a lip 20 for securing the fitment in the neck of a bottle. Otherwise, like reference numerals represent lik features t thos in earlier Figures.

In the embodiment in Figure 7, a ceramic or thermoset moulded weight 17 has been incorporated for sliding movement into and out of contact with flap valve 5 otherwise the fitment is identical to that in Figure 6. As explained earlier, the weight 17 will ensure that the flap valve 5 returns to its seat more quickly during pulse or vibration filling.

In Figure 8 the hollow float member 2 in previous embodiments has been replaced by a solid rubber float member 2 and the sealing member 3 is a snap fit within the float 2 having a flat surface rather than a needle configuration. The fitment is shown in an inverted position where the ball 4 rests in ball seat 21. The position of the ball 4 when the fitment is horizontal is indicated by broken lines. In addition, the float member 2 and sealing member 3 are connected directly to flap valve 5 for sealing liquid flow passage 6. The combined unit 2,3,5 can slide within housing 8 and the weight member 4 is located on the opposite side of flap valve 5 to previous embodiments. The passages 6 and 7 for liquid and air flow respectively, are still arranged to avoid mixing of liquid and air during pouring. Although mixing could occur within area 22, pouring usually takes place with the bottle between 30^{o} and 60^{o} below the horizontal where the liquid flow will be in the lower part of area 22 and the air flow will be in the upper part of area 22, giving negligible mixing.

In Figure 9, the fitment is shown in a horizontal position. Th float member 2, sealing member 3 and flap valve 5 are again connected to form a singl unit which can slid in housing 8. The

sealing member 3 is provided with an annular rim 3a which seats within float member 2. However, the embodiment in Figure 9 differs from that in Figure 8 in that there is a projection 23 from the float member 2 against which weight 4 pushes when the bottle in which the fitment is placed (not shown) is upright. There is also a retaining clip 5a which holds the flap valve 5 in position. The fitment has an extended portion 14 on housing 8 to increase the head and improve flow rate. Figure 9a is a view in direction A-A in Figure 9 of the housing 8 which forms a seat for flap valve 5 with four liquid passages 6. The positions of the ball 4 in different orientations of the fitment are represented by broken lines.

The preferred embodiment in Figure 10 (also shown in a horizontal position) is similar to that in Figure 9 except that the rubber sealing member 3 and annular rim 3a are now in the form of a rubber sucker 24. The sucker 24 seals against the housing 8 as well as air inlet 9 and has proved highly effective against vibration filling as the liquid needs to enter the sucker 24 to allow the float member 2 to open the air inlet 9. However, air can flow into the bottle via air inlet 9 during normal pouring.

In Figure 11, the fitment is located in a bottle 1 in an inverted position and is a further preferred embodiment where the sealing member 3 is connected to the weight member 4 in contrast to all earlier embodiments where the sealing member 3 and float member 2 are connected. The float member 2 is located at the opposite end of housing 8 to air inlet 9. There is als a diaphragm 25 having a central aperture 26. The fitment will operate substantially

as described earlier but during inverted filling the float member 2, which is lifted as liquid fills the passage 7, only has to seal the aperture 26 in diaphragm 25 rather than forcing the sealing member 3 into air inlet 9. The small notch or passageway 10 in weight member 4 will act as before to make it difficult for liquid to pass through air inlet 9 during vibration filling. The dipahragm 25 can deflect and accordingly, during horizontal filling the float member 2 will push the diaphragm 25 against weight member 4 which will in turn slide sealing members into contact with air inlet 9.

The preferred embodiment in Figure 12 differs from previous embodiments in that the float member 2 and weight member 4 have been combined to form a neutral buoyancy weight/float 29. The weight/float 29 has a rim 27 which restricts its movement by contact with a circumferential rim 28 on the inside of housing 8. The fitment is located in a bottle 1 which is in a horizontal position. The inverted position of the bottle is indicated by the weight/float in broken lines.

When the bottle 1 is inverted, the weight/float 29 will fall away from air inlet 9 and air can pass from passage 7 through air inlet 9 and into the bottle. If horizontal filling is attempted, the weight/float 29 has an offset centre of gravity which ensures that the sealing member 3 will fall against the air inlet 9. The sealing member 3 is slightly curved to ensure good contact. The bottle 1 will have to be inverted by approximately 120° before the sealing member 3 will move away from air inlet 9. During inverted filling liquid in passage 7 would lift the weight/float 29 to seal air inlet 9. During

vibration filling, the small gap between rim 27 and housing 8 will hinder the fl w of liquid towards air inlet 9.

Although each of the embodiments depicted in Figures 1 to 12 employ a standard flap valve 5 as a one-way valve means located in the liquid passage 6, it is envisaged that a number of alternative one-way valve means could also be effective. Examples of such valve means are shown in Figures 13 to 22.

In Figure 13, a die-cut silicone rubber disc 30 having a flap 30a covers a hole 31 in the valve seat 32. The flexibility of the rubber flap 30a must be controlled to ensure that it stays closed when the fitment in which the valve is incorporated is inverted unless it is pushed open by the weight of liquid behind it.

Figure 14 is a similar arrangement to Figure 13 except that a number of smaller rubber flaps 30a to 3h replace the single flap 30a in Figure 13.

Figures 15a and 15b depict a further flap valve arrangement having a "live hinge" 34 on each flap 30a, 30b, 30c and 30d. The hinge 34 allows each flap 30a, etc., to open more readily and also enables a wider range of materials to be used. Figure 15a shows the valve in an upright position, i.e when the bottle in which the valve is located is upright. The flaps 30a, etc., are each closed and seal respective holes 31 in valve seat 32. There is no flow of air through the valve via air passage 33. In Figure 15b the valve is inverted and liquid pushes open the flaps 30a, etc. Air will then pass in the opposite direction through air passage 33. Polyproylene is

envisaged as a suitable material for th disc 30 having a lower specific gravity than whisky and would therefore float into a closed position when upside down filling is attempted. Other materials may require a separate closing means.

Figure 16 shows a simple disc valve comprising a valve seat 35 having a number of holes 36 and a disc 37 which can slide on a stem 38 towards and away from valve seat 35. As mentioned earlier, polypropylene is a suitable material providing an excellent defence against upside down filling.

In Figure 17, a ball valve is shown comprising a ball 39 and a valve seat 40 having a hole 41. The ball 39 is located in a housing 42 which has a small hole 43 to allow liquid to flow therethrough. The housing 42 acts as a shock absorber for the ball 39 which is hollow or of a lightweight material.

Figure 18 also shows a ball valve arrangement but in this embodiment there are two balls 44 and 45 located in a housing 46 having two valve seats 47 and 48. Ball 44 is heavy and made of stainless steel, for example and will prevent filling when the bottle is upright. Ball 45 is lighter and made of polypropylene, for example, and will prevent filling when the bottle is inverted by floating on the liquid.

In Figure 19, twelve small ball valves 49 are used in parallel in two layers A and B. An air passage 50 passes through the valve arrangement for the flow of air into the bottle in which the valve arrangement is us d. Th balls 49 are preferably, made of polypropylene to enable them to float into a closed position during upside down filling. Since

the balls 49 are light they ar unlikely to be affected by vibration when surrounded by whisky, f r example, due to the relative viscosity of the whisky and the difficulty of imparting sufficient movement to the balls 49 due to their low inertia.

Figure 20 depicts an "umbrella" valve comprising a silicone rubber moulding 51 which is wafer thin around its circumference 52. The moulding 51 sits on a rigid plastic seat 53. An air passage 54 is provided for air to enter the bottle (not shown) in which the valve is located. When the valve is inverted to allow liquid to flow outwardly from the bottle the moulding 51 will collapse under the weight of liquid behind it allowing liquid to flow outwardly around its circumference 52. Air will then be drawn inwardly through air passage 54.

Figure 21 depicts a similar arrangement to that in Figure 20 but here the moulding 51 is a flat die-cut disc of silicone rubber mounted on a number of ribs 55.

The final example of a valve means for the liquid passage 6 is shown in Figure 22. Here a very thin film 56 of P.T.F.E. is supported by a grid 57. Liquid can pass through the film 56 easily in one direction but the film will tend to cling to the grid 57 because of surface tension if inverted. The grid 57 will support the film 56 if pressure filling is attempted and since the film 56 is very light it is expected to remain in contact with the grid 57 under vibration due to surface tension, the viscosity of the liquid (usually whisky) and the low inertia of the P.T.F.E.

A wide range of materials hav b en test d f r use in the fitments described. In general, rubber materials were rejected because of their poor performance under vibration filling. The most favoured material is a PVC of approximate thickness 0.15 mm which is approved for contact with food and is easily cut to shape.

CLAIMS:

1. A fitment for a bottle of the kind comprising a one-way valve mechanism to allow outward flow of liquid from the bottle and to prevent unauthorised refilling of the bottle and vacuum break means to allow air to pass into the bottle when a partial vacuum exists in the bottle wherein separate liquid and air passage means are provided for the outward flow of liquid from the bottle and the inward flow of air to the bottle.

2. A fitment as claimed in Claim 1, wherein the one-way valve mechanism comprises a first one-way valve means located in the air passage means and a second one-way valve means located in the liquid passage means.

3. A fitment as claimed in Claim 1 or Claim 2, wherein the vacuum break means is operable by gravity on inverting the bottle.

4. A fitment as claimed in Claim 1 or Claim 2, wherein the first one-way valve means comprises a float member, a weight member and a sealing member for sealing the air inlet of the air passage.

5. A fitment as claimed in Claim 4, wherein the weight member urges the sealing member into a position which seals the air inlet until the bottle is inverted by substantially 120^{o}.

6. A fitment as claimed in Claim 4 or Claim 5, wherein the float memb r and weight member form an integral member of neutral buoyancy.

7. A fitment as claimed in any of Claims 4, 5 or 6, wherein the vacuum break means comprises the float member and the sealing member of the first one-way valve means as an integral unit co-operating with the air inlet, the dimensions of the air inlet being such that the combined weight of the float member and sealing member cannot be held by a partial vacuum inside the bottle.

8. A fitment as claimed in any of Claims 4, 5 or 6, wherein the vacuum break means comprises the weight member and the sealing member of the first one-way valve means as an integral unit co-operating with the air inlet, the dimensions of the air inlet being such that the combined weight of the weight member and sealing member cannot be held by a partial vacuum inside the bottle.

9. A fitment as claimed in any one of Claims 4, 5 or 6, wherein the vacuum break means comprises the float member, the sealing member and the weight member of the first one-way valve means as an integral unit co-operating with the air inlet, the dimensions of the air inlet being such that the combined weight of the float member, the sealing member and the weight member cannot be held by a partial vacuum inside the bottle.

10 A fitment as claimed in Claim 2, wherein the second one-way valve means is a flap valve arrangement.

11. A fitment as claimed in Claim 2, wherein the second on -way valve means is a ball valve arrangement.

12. A fitment as claimed in Claim 2, wherein the second one-way valve means is a disc valve arrangement.

13. A fitment as claimed in Claim 2, wherein the second one-way valve means is an "umbrella" valve arrangement.

14. A fitment as claimed in Claim 2, wherein the second one-way valve means co-operates with a valve seat having a plurality of holes therethrough.

15. A fitment as claimed in any of Claims 10 to 14, wherein a weight is provided in the vicinity of the second one-way valve means which can slide into contact with and away from the valve means.

16. A fitment for a bottle substantially as herein described and as illustrated in the accompanying drawings.

17. A bottle comprising a fitment as claimed in any preceding claim.

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Examiner's report to th Comptroller under Section 17 (The Search R port) -21-

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Search Examiner

LINDA HARDEN

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search

10 DECEMBER 1992

Documents considered relevant following a search in respect of claims 1-17

Category (see ver)	Identity of document and relevant passages		Relevant to claim(s)
X	GB 0924728	(F SCHWARZMANN) see Figure 2	1-3, 10
X	GB 0477093	(E GODFREY) see Figures 1 and 2	1-3, 10, 12
X	GB 0364760	(J P MCCANCE) see Figure 1	1-3, 11
X	GB 0290393	(W MILLSOM) see Figure 4	1-3, 11
X	EP 0180411 A2	(HULLIHEN) see Figure 2 and page 10 lines 1-30	1-6, 11

Category	Identity of document and relevant passages	Relevant to claim(s)
	-22-	

Categ ri s of documents

X: Document indicating lack of novelty or of inv ntive step.

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